

Claims:

1. An apparatus configured to receive an expendable from an expendable container with a piezoelectric element attached, the apparatus comprising:

a detection signal generation circuit configured to charge and discharge the piezoelectric element, and generate a detection signal including information representing a cycle of remaining vibration of the piezoelectric element after a lapse of a predetermined standby time from a completion of the discharge; and

a controller configured to generate a clock signal, and control the charge and the discharge of the piezoelectric element, wherein

the cycle is available for determining whether a residual quantity of the expendable is greater than a preset level, and

the controller is configured to determine the predetermined standby time by counting a number of pulses in the clock signal.

2. The apparatus in accordance with claim 1, wherein

the controller is capable of changing the predetermined standby time.

3. An expendable container capable of measuring a residual quantity of stored expendable, the expendable container comprising:

an expendable tank configured to store the expendable and have a piezoelectric element attached;

a detection signal generation circuit configured to charge and discharge the piezoelectric element, and generate a detection signal including information representing a cycle of remaining vibration of the piezoelectric element after a lapse of a predetermined standby time from a completion of the discharge; and

a controller configured to generate a clock signal, and control the charge and the discharge of the piezoelectric element, wherein

the cycle is available for determining whether a residual quantity of the expendable is greater than a preset level, and

the controller is configured to determine the predetermined standby time by counting a number of pulses in the clock signal.

4. The expendable container in accordance with claim 3, wherein

the controller is capable of changing the predetermined

standby time.

5. The expendable container in accordance with any of claim 3 and 4, wherein

the controller generates the clock signal in response to a signal provided from outside of the expendable container.

6. An expendable container capable of measuring a residual quantity of stored expendable, the expendable container comprising:

an expendable tank configured to store the expendable; and

a piezoelectric element attached to the expendable tank, wherein

the piezoelectric element is configured to charge and discharge in response to an electric current provided from an outside apparatus, and output a voltage wave only in an predetermined frequency in response to a remaining vibration of the piezoelectric element after a lapse of a predetermined standby time from a completion of the discharge, wherein

the predetermined frequency is available for determining whether a residual quantity of the expendable is greater than a

preset level, and

the predetermined standby time is determined by counting a number of pulses in a clock signal generated by the outside apparatus.

7. A method of measuring a residual quantity of expendable stored in an expendable container, the method comprising the steps of:

(a) providing an expendable tank configured to store the expendable and have a piezoelectric element attached, and a circuit configured to charge and discharge the piezoelectric element;

(b) generating a clock signal;

(c) charging the piezoelectric element;

(d) discharging the piezoelectric element;

(e) waiting a lapse of a predetermined standby time from a completion of the discharge;

(f) generating a detection signal including information representing a cycle of remaining vibration of the piezoelectric element after the lapse of a predetermined standby time;

(g) determining whether a residual quantity of the expendable

stored in the expendable tank is greater than a preset level,  
according to the detection signal; and

the step (e) includes the step of determining the  
predetermined standby time by counting a number of pulses in the  
clock signal.